

## *REMARKS*

Applicants thank the Examiner for the very thorough consideration given the present application.

Claims 1, 2-4, 7, 12-15, 17, 20 and 21-22 are now present in this application. Claims 1, 21 and 22 are independent.

Claims 5, 6, 8, 9, 10, 11, 16, 18 and 19 have been canceled, claims 21 and 22 have been added, and claims 1, 12, 13, and 17 have been amended. Reconsideration of this application, as amended, is respectfully requested.

### *I. Information Disclosure Citation*

Applicants thank the Examiner for considering the reference supplied with the Information Disclosure Statement filed February 11, 2004, and for providing Applicants with an initialed copy of the PTO-1449 form filed therewith.

### *II. Rejection Under 35 U.S.C. § 102 and/or § 103(a)*

Claims 1-10, and 13-18 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Salyer (U.S. Patent No. 5,565,132). This rejection is respectfully traversed.

A complete discussion of the Examiner's rejection is set forth in the Office Action, and is not being repeated herein.

The amended claim 1 of the present invention relates to a heat absorb-release plastic resin composition comprising a matrix resin material, a phase transition material, a compatibilizer, and a thermally conductive solid additive. The amended Claim 13 relates to a molded product prepared from the heat absorb-release plastic resin composition. In the present composition, the ratio by weight of the matrix resin and the phase transition material ranges from 60:40 to 80:20.

In contrast, Salyer (U.S. Patent 5,565,132) discloses a composite useful for thermal energy storage comprising about 15-22 weight percent of polyolefin resin selected from the group consisting of uncrosslinked high density polyethylene and polypropylene, about 7-12 weight percent of an ethylene-vinylacetate copolymer, an ethylene-methyl acrylate copolymer, and ethylene-ethyl acrylate copolymer, about 7-16 weight percent of silica particles, and 55-60 weight percent of a phase change material.

Therefore, the elements of the heat absorb-release plastic resin composition differ from that of the invention of Salyer (U.S. Patent 5,565,132). As a result, Claims 1-10, 13-18 of the present invention satisfy the novelty requirement of 35 U.S.C. 102 (a).

The composite of Salyer (U.S. Patent 5,565,132) comprises a great quantity of phase change material (2.5 - 4 times as much as polyolefin resin) to improve heat of fusion of the composite, and silica particles to eliminate "oozing" (exuding) of the phase change material during thermocycling of the

composite (Salyer column 1, line 42-58).

However, Salyer does not disclose any method to improve flexural modulus and heat conductivity of the composite. The composite of Salyer exhibits low flexural modulus because of the presence of significant quantity of phase change material, and it cannot be molded into shaped plastic product.

For reference, Applicants have measured the flexural modulus of the composite of Salyer and attached the results as Annex. As shown in the Annex, Applicants point out that that the flexural moduli of the composites are less than 1000 Kg/cm<sup>2</sup> (see the Annex).

Therefore, the composite of Salyer can arguably be used for packing materials (for examples, pellets, sheets, rods, tubes, plugs for hollow core cement blocks, films, and fibers) but cannot be used for producing shaped plastic (Salyer column 1, line 62-66 and Claims 18, 19).

In contrast, the heat absorb-release plastic resin composition of the present invention has flexural modulus being 3000 Kg/cm<sup>2</sup> or more, because the composition comprises a small quantity of a phase transition material (1/4 - 2/3 times as much as matrix resin).

And, the composition of the present invention has heat conductivity being 0.4W/m-K or more, because the composition comprises a thermally conductive solid additive.

Therefore, the composition of the present invention can be used for a shaped plastic product (molded product), and the heat absorption and release

ratio and the depth of thermal diffusion of the composition are prominent. It is supported by the Examples of the specification of the present invention.

Therefore, the present invention is not obvious from the cited reference (Salyer) at the time that the invention was made to a person having ordinary skill in the related art. As a result, Claims 1-10 and 13-18 of the present invention satisfy the non-obviousness requirement of 35 U.S.C. 103(a).

### *III. Rejection Under 35 U.S.C. § 103(a)*

Claims 11, 12, 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being obvious over Salyer (U.S. Patent No. 5,565,132) in view of Nguyen et al. (US2003/0068787). This rejection is respectfully traversed.

Nguyen et al. (US2003/0068787) disclose a crosslinkable thermal interface material being produced by combining at least one rubber compound, at least one amine resin, and at least one thermally conductive filler. The interface material takes on the form of a "liquid" or "soft gel" (Abstract of Nguyen et al.). Namely, the elements of Nguyen et al. differ from the present invention, and the crosslinkable thermal interface material of Nguyen cannot be used for shaped plastic.

Though, Nguyen reveals a thermally conductive solid which includes a list metals and carbon fiber to increase the thermal conductivity of a crosslinkable thermal interface material, there are no statement about heat absorb-release properties and flexural modulus of the composition in Nguyen

et al.(US2003/0068787).

Therefore, the present invention is not obvious from the cited references (Salyer, and Nguyen et al.) at the time that the invention was made to a person having ordinary skill in the related art. As a result, claims 11, 12, 19, and 20 of the present invention satisfy the non-obviousness requirement of 35 U.S.C. 103(a).

#### *IV. Conclusion*

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone James T. Eller, Jr., Registration No. 39,538, at (703) 205-8000, in the Washington, D.C. area.

Prompt and favorable consideration of this Amendment is respectfully requested.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit

Docket No. 0808-0347P  
Application No. 10/775,147

Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Annex (Flexural modulus data of the composite of Salyer)

Annex

**<Flexural modulus data of the composite of Salyer>**

Tester : LG Chem. LTD. Dr. LEE, Heon-Sang

Method : ASTM D 790

	K18/HDPE/EVA/ABS 60/16/8/16	K18/HDPE/EVA/ABS 65/25/10/10
Phase change material (K-18) (wt%)	60	65
HDPE (wt%)	16	25
EVA (wt%)	8	10
Silica(ABS) (wt%)	16	10
Flexural Modulus(W/m-K)	Not measurable (less than 1000 W/m-K)	Not measurable (less than 1000 W/m-K)